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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :
STEPHAN BAUER, ET AL : GROUP: 1796
SERIAL NO: 10/524,039 :
FILED: FEBRUARY 9, 2005 : EXAMINER: COONEY, J.
FOR: METHOD FOR THE PRODUCTION :
OF LOW-EMISSION
POLYURETHANE SOFT FOAMS

APPEAL BRIEF (AMENDED)

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

The following is an appeal to the Board of Appeals under 35 U.S.C. § 134 from the November 10, 2008, Final Rejection of Claims 17-20 and 22-32 of Application No. 10/524,039, filed on February 9, 2005. A Notice of Appeal was timely filed March 9, 2009, with a request for one month extension of time.

REAL PARTY OF INTEREST

BASF SE is the real party of interest in the above-identified application.

RELATED APPEALS AND INTERFERENCES

There are no applications on appeal or in interference that are related to the present application.

STATEMENT OF JURISDICTION

The Board of Patent Appeals and Interferences (Board) has jurisdiction under 35 U.S.C. § 134. This is an appeal to the to the Board from the Final Rejection of pending claims 17-20 and 22-32, dated November 10, 2008. A Notice of Appeal was timely filed March 9, 2009, with a request for one month extension of time. An Appeal Brief was timely filed on May 8, 2009, with no extension of time. Notification of Non-Compliant Appeal Brief was mailed June 15, 2009, requiring Applicants to file an amended brief making corrections under 37 C.F.R. § 41.37(c)(1)(v) and § 41.37(c)(1)(vii) within ONE MONTH from the mailing date of the Notification. This Appeal Brief (Amended) containing proper corrections was timely filed on July 15, 2009, with no extension of time.

STATUS OF CLAIMS

Claims 1-16 and 21 have been canceled. Claims 17-20 and 22-32 are rejected, pending, and on appeal. The rejection of Claims 17-20 and 22-32 is herein appealed.

STATUS OF AMENDMENTS

No amendment to Claims 17-20 and 22-32 on appeal have been entered or submitted after the Examiner's November 10, 2008, final rejection thereof. Applicants filed a Response

on January 27, 2009. In an Advisory Action dated February 26, 2009, the Examiner indicated that the Applicants' response does NOT place the present application in condition for allowance for reasons disclosed therein.

SUMMARY OF CLAIMED SUBJECT MATTER

Independent Claim 22 is directed to a process for producing low-emission, flexible polyurethane foams by reacting a) a polyisocyanate with b) a compound having at least two hydrogen atoms which are reactive toward an isocyanate group, wherein the compound is a polyether alcohol which has been prepared by addition of an alkylene oxide to a compound derived from renewable raw materials (Claim Appendix, Claim 22; and Specification, page 3, lines 25-40) selected from the group consisting of castor oil, polyhydroxy fatty acids, ricinoleic acid, hydroxyl-modified oils, grapeseed oil, black caraway oil, pumpkin seed oil, borage seed oil, soybean oil, wheat germ oil, rapeseed oil, sunflower oil, peanut oil, apricot kernel oil, pistachio nut oil, almond oil, olive oil, macadamia nut oil, avocado oil, sea buckthorn oil, sesame oil, hemp oil, hazelnut oil, evening primrose oil, wild rose oil, hemp oil, safflower oil, walnut oil, hydroxyl –modified fatty acids and fatty acid esters myristoleic acid, palmitoleic acid, oleic acid, vaccenic acid, petroselinic acid, gadoleic acid, erucic acid, nervonic acid, linoleic acid, α - and γ -linolenic acid, stearidonic acid, arachidonic acid, timnodonic acid, clupanodonic acid, cervonic acid (Specification, page 5, lines 27-40) in the presence of a DMC catalyst (Specification, page 3, line 38), said polyether alcohol having a maximum odor value of 2.0 or less (Specification, page 4, lines 5-9). The flexible polyurethane foam product has a maximum VOC value of 100 ppm and a maximum FOG value of 200 ppm (Specification, page 3, lines 42-47), according to the methods of determining VOC and FOG values as described in "Analysis of the emission of volatile and

condensable substances from vehicle interior materials by thermodesorption” (PB VWL 709), DaimlerChrysler, January 2001 (Specification, page 2, lines 30-34).

GROUND S OF REJECTION TO BE REVIEWED

Whether Claims 17-20 and 22-32 stand properly rejected based on the first paragraph of 35 USC 112.

Whether Claims 17-20 and 22-32 stand properly rejected based on 35 USC 103 as unpatentable over Sugiyama et al, U. S. Patent 6,313,060 in view of JP-05163342.

ARGUMENT

Whether Claims 17-20 and 22-32 are properly rejected based on the first paragraph of 35 USC 112.

Appellants do not agree that the written description is defective in that it fails to convey to one of skill in the art that the inventors, at the time the application was filed, had possession of the claimed invention. The specification of the present application on page 2 provides a sufficient discussion of the problem of emissions of condensable materials from flexible polyurethane foams and describes a system of determining the extent of emissions in terms of FOG and VOC values. The actual maximum FOG and VOC values of the present claims are described in the last paragraph of page 3 of the specification. During prosecution in order to make clear how the FOG and VOC values were and are determined, an English translation of the flexibility after aging test mentioned on page 3, lines 11-16 of the specification was submitted along with a printed document describing the well known test procedures for determining the VOC and FOG values identified as PB VWL 709 (see page 4, lines 11-30 of the specification).

The Examiner has objected to the so-called foreign test standard that is present in the claims which describes the specific steps which are followed in order to determine VOC and FOG values of flexible polyurethane foams of the invention, simply because the standard procedure referred to is said to be of foreign origin and therefore non-enabling of the present invention. This is manifestly incorrect. In the first place the document is written in English, not German (although a German language document of the specifications exists.). Specific steps are described as to how to determine VOC and FOG values so that the document provides at the very least a precise description of the methodology to be followed in order to determine these values. The steps of analysis to be followed leave nothing to guess-work. In fact, as stated on page 2, lines 30-34, the test method PB VWL 709 is an established commercial test method that has gained wide acceptance within the automobile industry.

Further, the document can not be said to be “foreign” because, at the very least, the Chrysler component of DaimlerChrysler is a former major U. S. automaker. Obviously, therefore, the procedures described in the document in question were known at the very least to workers of Chrysler in the American automobile industry. However, quite likely the disclosure of the standard test is well known to other automobile manufacturers in the U. S. beyond DaimlerChrysler. Further, there is nothing indefinite about the written standard so that one of skill in the art would be enabled by the disclosure of the document to obtain needed VOC and FOG values for a flexible polyurethane foam. Appellants therefore believe that the non-reference ground of rejection has been rendered null and void.

Whether Claims 17-20 and 22-32 are properly rejected based on 35 USC 103 as unpatentable over Sugiyama et al, U. S. Patent 6,313,060 in view of JP-05163342.

As is clear from the present specification at page 2, attempts have been made to produce flexible polyurethane foams from polyether alcohols that have been prepared from what is termed renewable raw materials such as castor oil. Basic catalysts such as sodium and

potassium hydroxides and alkoxides have been used to facilitate the polyether alcohol forming reaction, but upon the formation of a foamed polyurethane product, the product exhibits very poor odor, fogging and emissions properties. For instance, when castor oil is employed as the initiator, considerable amounts of ricinoleic acid are formed. This ring containing material can only be removed incompletely by simple steam stripping. The polyether alcohol product and foams produced therefrom display unacceptable odor, fogging and emissions characteristics. The foams produced therefore are not commercially acceptable products. With regard to castor oil specifically, as a renewable raw material, the result is a foamed polyurethane product that contains substantial amounts of cyclic fatty esters which exhibit unacceptably high levels of emissions as is evident from the VOC and FOG values normally obtained.

Directing attention now refer to the cited JP '342 reference, here the inventors addressed the problem accompanying the use of castor oil as an initiator for the preparation of polyether alcohols in which the use of an alkali catalyst known conventionally for this reaction resulted in the decomposition of the double bond in the material. On the other hand, when a Lewis acid catalyst is used for the reaction, the problem encountered there was that the amount of polyether prepared was unsatisfactory. These problems with respect to polyether alcohol synthesis are solved in '342 for the specific reaction of castor oil and alkylene oxide by the use of a metallocyanide complex compound as the catalyst. It is to this problem that essentially all of the disclosure of '342 is directed. Only the briefest mention (general in nature) of the use of the specific polyether alcohol of the reference as the polyol for the preparation of a polyurethane upon reaction with an isocyanate is provided at paragraph [0027]. Nothing is said in the reference about the problems of odor, FOG and VOC mentioned in the present invention. Nothing is said about the preparation of polyurethane foams. There is not the slightest teaching or suggestion that would lead one of skill in the art

to expect that if a polyether alcohol, prepared by metallocyanide complex catalyzed reaction of castor oil with an alkylene oxide, is used in a reaction with a polyisocyanate to prepare a foamed polyurethane product, that the product obtained would exhibit satisfactory emissions characteristics as evidenced by reduced odor and low VOC and FOG values.

The disclosure of the cited Sugiyama et al patent is directed to a method of preparing a resilient polyurethane foam material by reacting a polyisocyanate with a polyether alcohol that is prepared by the ring opening reaction of an alkylene oxide compound that has carbon atom content of at least 3 with an initiator which is a monohydroxy initiator such as methanol, isopropyl alcohol, butanol or the like (col 8, lines 5-10), or a polyhydroxy compound containing 2 to eight hydroxyl groups such as sorbitol, sucrose, pentaerythritol, or the like (col 8, lines 15-20) in the presence of a double metal cyanide complex catalyst. The objective sought in the patent is to prepare such a foamed material that has much improved crushing and cushioning properties over those known to the prior art. For the preparation of the polyether alcohol reactant, no initiator that is a renewable raw material detailed as in the present claims is shown or suggested. Not only that, there is no description of the problem faced in the particular area of preparing foamed polyurethanes from polyether alcohols in turn prepared from initiators of renewable raw materials, nor is there any suggestion that the problem elucidated on the record of VOC, FOG and odors emanating from conventional polyurethane foams in turn prepared from polyether alcohols obtained from renewable raw materials can be eliminated.

Another aspect of the disclosure of the '060 patent which mitigates against its combination with '342 is that the procedure of preparing a polyether polyol is more complex than either that of the present claims or the procedure of '342. That is, the patent deems it necessary in the preparation of a polyether alcohol, that if a metallocyanide complex is to be used as a catalyst for the preparation of the polyether alcohol, the initiator must be reacted

with an alkylene oxide having a carbon atom content of at least 3 (see col 3, lines 46-52 or col 8, lines 5-20). By this definition, specifically, ethylene oxide is excluded as a reactant. If, however, ethylene oxide is to be employed also in the polyether forming reaction, **it must be done so using a conventional alkali metal hydroxide or alkoxide catalyst.** (See col 7, lines 49-55 and col 8, lines 5-20). No such conditions are imposed upon the polyether alcohol forming reaction of the present claims!

The Examiner stated in the bottom paragraph of page 3 of the final Office Action that Sugiyama et al *is not limited only to the specific initiator exemplified.* To the contrary, appellants submit that the disclosure of the patent is limited to an initiator that is a monol or is a polyol compound that expressly contains from 2 to 8 hydroxy groups. Thus, compounds such as various glycols, glycerol and other trihydroxy compounds, as well as a sugar, a sugar alcohol and alcohol amines. Nowhere in this group of varieties of polyols is mention made of a renewable raw material as claimed in the present invention.

The Examiner also states (on page 3 of the Office Action) that the '3342 reference discloses the preparation of *polyols made from initiators as defined by applicants' claims.* This is not correct. The reference discloses a polyol made by the reaction of castor or denatured castor oil only as an initiator with an alkylene oxide. No other renewable raw material is disclosed, and certainly no examples of foamed polyurethanes are disclosed. The combined references simply do not compel or motivate the skilled artisan to make an advance in the technology of foamed polyurethane materials as to their important emission characteristics by employing a different catalyst system for preparation of the foamed material. Yet the maximum VOC and FOG values are positively claimed in the present claims where a foamed product of improved emission characteristics is obtained.

Claims 17-20

Each of these claims is directed to a specific product, each being dependent upon the foamed polyurethane product produced by the process of Claim 22. None of these products is shown or suggested in the cited and applied prior art, neither of which teaches or suggests a foamed flexible polyurethane prepared by the DMC catalyzed reaction of a polyisocyanate with a polyether alcohol which in turn is obtained from a reaction involving a renewable raw material. Accordingly, each of these products is believed separately patentable.

CONCLUSION

Appellants maintain that the continued rejections of the present claims is erroneous and that the decision by the Examiner should be REVERSED.

Respectfully submitted,

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CLAIM APPENDIX

The following is a list of pending claims in the application.

Claim 17. A low-emission flexible polyurethane slabstock foam produced by the process as claimed in claim 22.

Claim 18. A motor vehicle comprising said low-emission flexible polyurethane slabstock foam as claimed in claim 17.

Claim 19. An article of furniture or a mattress comprising said low-emission flexible polyurethane slabstock foam as claimed in claim 17.

Claim 20. The low-emission flexible polyurethane slabstock foam as claimed in claim 17 having reduced crack formation.

Claim 22. A process for producing low-emission flexible polyurethane foams by reacting:

- a) a polyisocyanate with
- b) a compound having at least two hydrogen atoms which are reactive toward an isocyanate group,

wherein said compound is a polyether alcohol which has been prepared by addition of an alkylene oxide to a compound derived from renewable raw materials selected from the group consisting of castor oil, polyhydroxy fatty acids, ricinoleic acid, hydroxyl-modified oils, grapeseed oil, black caraway oil, pumpkin seed oil, borage seed oil, soybean oil, wheat germ oil, rapeseed oil, sunflower oil, peanut oil, apricot kernel oil, pistachio nut oil, almond

oil, olive oil, macadamia nut oil, avocado oil, sea buckthorn oil, sesame oil, hemp oil, hazelnut oil, evening primrose oil, wild rose oil, hemp oil, safflower oil, walnut oil, hydroxyl-modified fatty acids and fatty acid esters myristoleic acid, palmitoleic acid, oleic acid, vaccenic acid, petroselinic acid, gadoleic acid, erucic acid, nervonic acid, linoleic acid, α - and γ -linolenic acid, stearidonic acid, arachidonic acid, timnodonic acid, clupanodonic acid, cervonic acid in the presence of a DMC catalyst, said polyether alcohol having a maximum odor value of 2.0 or less; and wherein the flexible polyurethane foam product has a maximum VOC value of 100 ppm and a maximum FOG value of 200 ppm, according to the methods of determining VOC and FOG values as described in "analysis of the emission of volatile and condensable substances from vehicle interior materials by thermodesorption" (PB VWL 709), DaimlerChrysler, January 2001.

Claim 23. The process as claimed in claim 22, wherein said polyether alcohol has a mean molecular weight M_w in the range from 400 to 10,000 g/mol.

Claim 24. The process as claimed in claim 22, wherein said polyether alcohol has a mean molecular weight M_w in the range from 1000 to 8000 g/mol.

Claim 25. The process as claimed in claim 22, wherein said polyether alcohol has a content of cyclic fatty acid esters of not more than 50 ppm.

Claim 26. The process as claimed in claim 22, wherein said polyether alcohol has a content of cyclic fatty acid esters of not more than 10 ppm.

Claim 27. The process as claimed in claim 22, wherein said low-emission flexible polyurethane foam has a wet compressive set of not more than 7 %, as determined in accordance with the operating procedure identified as AA U10-131-041 of February 6, 2002.

Claim 28. The process as claimed in claim 22, wherein said low-emission flexible polyurethane foam has a compressive set, after aging in accordance with DIN EN ISO 2440, of not more than 10 %.

Claim 29. The process as claimed in claim 22, wherein said polyisocyanate is an aliphatic diisocyanate, at least one aromatic diisocyanate or a polyisocyanate modified by incorporation of a urethane, uretdione, isocyanaurate, allophanate, iretonimine or other group therein.

Claim 30. The process as claimed in claim 22, wherein said polyisocyanate is hexamethylene diisocyanate, isophorone diisocyanate, tolylene diisocyanate, diphenylmethane diisocyanate or polymethylenepolyphenylene polyisocyanate.

Claim 31. The process as claimed in claim 22, wherein the polyether alcohol has an odor value of 1.7 or less, as determined by the standard test method identified as PPU 03/03-04.

Claim 32. The process as claimed in claim 22, wherein the flexible polyurethane foam product has a maximum VOC value of 50 ppm and a maximum FOG value of 100 ppm.

EVIDENCE APPENDIX

Appellants enclose copies of the European Standard Test EN ISO 2440 for determining the compressive set of flexible slabstock foams under accelerated aging conditions. Also enclosed is an English language copy of inhouse test procedures identified as PB VWL 709 for determining the VOC and FOG values of condensable substances discharged from vehicle interior materials by thermodesorption.

RELATED PROCEEDINGS APPENDIX

No copy of a decision rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) is enclosed.